



THE HYDRO-ELECTRIC POWER COMMISSION OF ONTARIO

W. ROSS STRIKE, Q.C.

620 UNIVERSITY AVENUE

January 7, 1963

Mr. Stanley J. Randall, Chairman, Ontario Economic Council, c/o General Steel Wares Ltd., 199 River Street, Toronto 2, Ontario.



Dear Mr. Randall:

In accordance with your request we have endeavoured to make a point by point analysis of the article appearing in the November 5th issue of Barron's titled "No Shining Light".

It is impossible to make a proper comparison of two such different power systems. One has a service area covering 250,000 square miles, a combination of hydraulic, conventional thermal and nuclear thermal generating stations and was established to provide power at cost; the other has a service area of 22,000 square miles, has an all hydro-electric system and was set up as a profit-making organization.

Translated into more meaningful terms, Ontario Hydro and the associated municipal electrical utilities have an overall customer density of 7.76 customers per square mile, which customers created a primary peak demand of 5,948,800 kw in December 1961. This is equivalent to 3.07 kw per customer. On the other hand, the Shawinigan System (quoted by the author) has an overall customer density of 16.79 customers per square mile, and the primary power peak load in 1961 was 2,159,900 kw. This is equivalent to 5.85 kw per customer.

In this vast area of 250,000 square miles Ontario Hydro has an obligation to meet every legitimate demand for power - it hasn't the right to discriminate between the truly economic and the marginally economic customers.

The point by point analysis of the article is further complicated by the fact that in some cases the author compares Ontario Hydro to Shawinigan and, in others, to Quebec as a whole. Also, precise information pertaining to Shawinigan

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is limited to short form annual reports and to the best of our knowledge complete information similar to that contained in Ontario Hydro's annual reports is simply not available. However, we have classified the so-called points made by the author and deal with them individually in the balance of this memorandum. The author's points are:

- I. That "nationalization" of the power industry in Quebec will result in less efficient service and higher costs as proved by Ontario Hydro's performance since 1906.
- II. The uncanny ability of Ontario Hydro to put first things last.
- III. Various criticisms of Rates.
 - IV. That Shawinigan has shown a greater penetration of the market for electricity or, in other words, "the Shawinigan system achieved much greater headway in spreading the use of electricity".
 - V. That Ontario Hydro's rates would be still higher if it paid taxes like private industry.
 - VI. Certain other derogatory comments.
- I. That "nationalization" of the power industry in Quebec will result in less efficient service and higher costs as proved by Ontario Hydro's performance since 1906.

While this appears to be the key statement of the article under the sub-title "Dim Outlook", there are only two specific statements made in the article which attempt to support the claimed inefficiency.

1. The first appears under the title "Mounting Payroll" where it is claimed that Ontario Hydro sales per employee in 1961 were less than half the Shawinigan group's 36,598 kwh. In more specific terms they make the comparison that it takes 12,515 regular workers

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to sell 35 billion kwh, while in Shawinigan it takes only 3,228 to sell 13.5 billion, or 48.8% less.

They further state that in the six years 1955-60 Ontario boosted its employees 17.5% while the number of customers rose 21.4%. During this same period the Shawinigan group with 21.1% increase in customers effected a small reduction in employment.

In the first place, Ontario Hydro's regular employees declined by 7.8%, from 13,567 in 1955 to 12,515 - not an increase of 17.5%.

The above comparisons are, of course, completely meaningless unless the composition of the compared work forces is known. For instance, we are aware of the fact that all of Shawinigan's engineering and construction are done by a separate service company or contractors, while Ontario Hydro employs 2,680 persons on this work.

In addition to knowing the composition of the staffs to be compared, a great deal must be known about the nature of the customers. Evidently the writer has included a power customer with say a load of many million kwh per month on equal terms with say a residential customer using 500 kwh per month. To relate such manpower figures to such customers or loads is completely meaningless. It is more meaningful to look at Ontario Hydro's management practices.

The management of the Commission prides itself upon its vigorous utilization of the most up-to-date management methods and practices and welcomes expert comparison of its record in this regard with any of the leading private enterprise organizations in North America. The Commission's practices in this regard include:

Electronic Data Processing
Work Measurement and Performance Standards
Systems and Methods Analysis
Work Simplification Training
Aggressive Utilization of Plant Automation
Complete Budgeting Procedures and Control Methods
Staff Training Programs
Load and Cost Trend Forecasts
Membership in American Management Association
and Industrial Conference Board

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In addition, recognized Management Consultants have been engaged from time to time to review the effectiveness of the Commission's organization structure.

2. The second claim to inefficiency has to do with the provision of spare capacity which the article infers is now unavailable and, if provided for, would require additional revenues of \$9.5 million to carry, or a 4% boost in rates. This statement is prefaced by the words "according to expert appraisal Hydro should have 15% spare capacity" without indicating who the expert is or what the 15% relates to.

However, by a careful reading of the article it can be inferred that the 15% relates to the Commission's own generating resources (thus excluding firm long term purchase contracts). Thus, the author claims that we should be carrying 15% of the 6,113,000 kw of existing generation, presumably on the basis that it is needed to cover:

The possible loss of long term purchase contracts which he refers to as "estimated purchasable"

620,000 kw

Loss of generating equipment and deviations in load forecasts

296,000 kw

Total

916,000 kw

If the author is thus casting doubt on the reliability of purchase contracts which are equivalent to 10% of Ontario Hydro's dependable generating capacity, it is worth noting that Shawinigan has purchase contracts equivalent to 40% of its installed generating capacity. However, the Commission is quite satisfied that its power purchase contracts are completely reliable.

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In our opinion, to form an expert appraisal of the spare capacity required involves an intimate knowledge of the prevailing operating conditions including such things as:

- The effect at Niagara Falls of adverse winds (a) on the water level of Lake Erie;
- (b) Records of Stream Flows:
- (c) Relationship between available hydraulic resources and steam generation capacity;
- (d) The operating significance of equipment and line outages.

The expert should also be familiar with the load forecasting techniques in use and historical data on the rate of past load growth in Ontario.

In an endeavour to assess these operating conditions, forecasts and risks, various specialists in Ontario Hydro place values on the following factors roughly five years ahead of time in order that adequate time will be available to plan and build the required resources.

- The most probable load to be supplied as determined from field surveys of our customers.
- An allowance for possible deviation from ii. load forecast.
- iii. Extent to which load may be interrupted by contract.
 - iv. Allowances for equipment outages and regulating margin.

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In planning the resources needed in 1966 for the Southern Ontario and Northeastern Ontario power system, an estimated 676,000 kw of spare capacity will exist (authorized December 1966 dependable peak capacity in excess of most probable load). This figure presumably compares with the 296,000 kw derived by an analysis of the author's statements as set out earlier in these notes.

If it were necessary to expand this reserve capacity, it could be done at a capital cost of about \$110.00 per kw and not the \$150.00 quoted by the author.

Immediately following the war the Commission encountered a power shortage for two winters which was not occasioned by any inadequacy in its planning methods but rather by a combination of the following:

- A. Phenomenal postwar growth of load contrary to expectations of most economists on the continent;
- B. Inability to construct new generation at an appropriate rate because of the restrictions imposed on construction throughout the war; subsequent to the war shortages of material and labour also restricted construction;
- C. A very unusual water shortage.
- II. The uncanny ability of Ontario Hydro to put first things last.

The only decision specified to support the above claim relates to the claimed delay in carrying through the Frequency Standardization Program.

The author does not seem to realize that the choice of 25 cycles was dictated by original conditions at Niagara, and that the choice of frequency was made initially by the



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private power companies operating on the American side of the Niagara River on the basis that motive rather than lighting load would predominate and, furthermore, the lower frequency was more suitable at the time for transmission of power to Toronto some 90 miles away. This was considered long distance transmission at the time. A major standardization program could not be financed by anyone during the 1930s (although there was a minor conversion from 66-2/3 cycle to 25 cycle for the purpose of reducing thermal generation during that period). During World War II resources could not be diverted from the war effort. so that the postwar period offered the first opportunity. This period happened to be one of unprecedented load growth, although a major depression had been widely anticipated in many quarters.

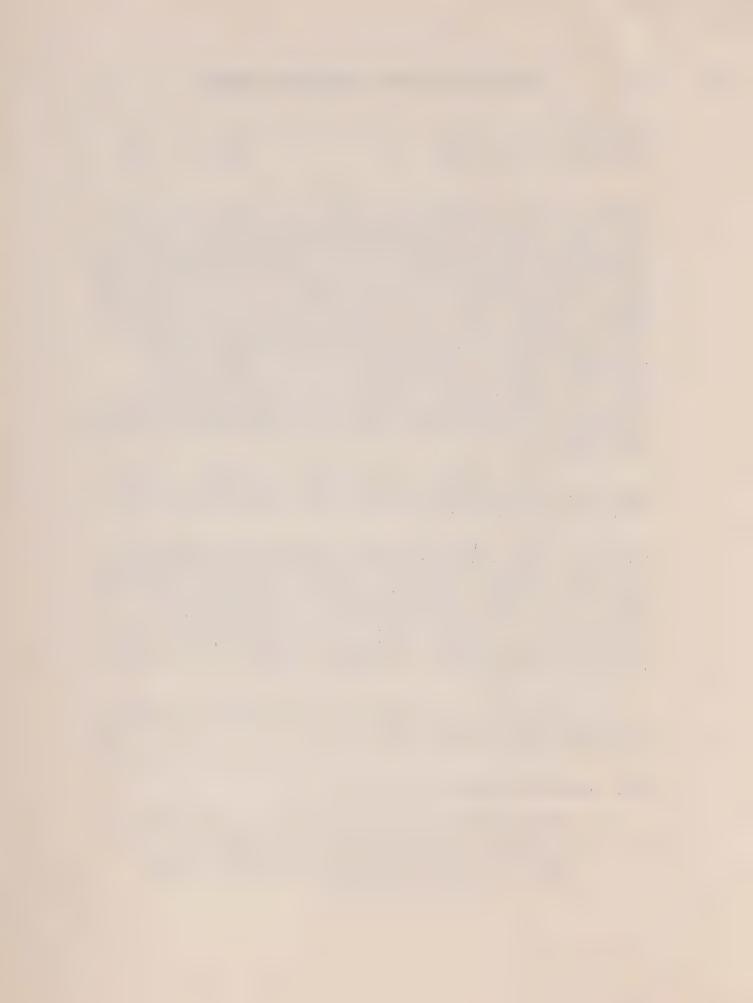
The statement "in the 1930s the entire program could have been carried out in Ontario for \$50 million or so", cannot be verified.

It is true that power customers throughout the Province shared the cost of converting their equipment to 60 cycles; however, the major portion of the cost of this impressive project is being amortized through the cost of power. It would be extremely naive to believe that Shawinigan's customers have not also paid in their rates for the cost of its minor frequency conversion even though the author implies that the Company carried out the work "at its own expense".

It might be interesting to know that for sound economic reasons the Commission still has 25 cycle load as do neighbouring private utilities.

III. Various Criticisms of Rates.

"Between 1951 and 1961 the cost of electricity (a) to consumers in Ontario mounted steadily. A distinctly opposite trend by contrast was in progress at the average private utility operation in the United States."



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Undoubtedly this statement refers to the cost of electric service to residential customers, and the fact that this class of customer in the United States was paying an average charge of 2.45 cents per kwh for 4.019 kwh in 1961 as compared to 2.81 cents per kwh for 2,021 kwh in 1951 (per Edison Electric Institute). Despite the fact that the average residential consumption almost doubled in this 10-year period, the charge in 1961 of 2.45 cents per kwh remains relatively high.

By comparison, municipal residential customers in Ontario have enjoyed the benefits of much lower cost electric service for decades; for example, the average cost per kwh to this class of customer: in 1941 was 1.27 cents; in 1951, 1.07 cents; and in 1961, 1.13 cents. The average kwh used were 2.090 in 1941, 3,831 in 1951 and 5,658 in 1961. The comparative figure for Shawinigan in 1961 was 636 kwh lower.

In Ontario, rates for electric service are not static; they are constantly under review to ensure that our customers and the customers of the municipal utilities, are served at the lowest possible cost. There are many factors which cause municipal utility rates to fluctuate from time to time such as the level of building activity within a particular municipality, the retirement of debt by the utility and abnormal or subnormal maintenance.

It is of interest to note that during the period January 1, 1956 to December 31, 1961 there were 276 reductions in rates in municipalities while there were only 83 increases.

It is quite true that rates to some Ontario customers increased in 1953 over the rates which prevailed from the end of World War II until 1952. This increase was due to the accumulation of major expenditures in both system and municipal plant to meet the tremendous load growth following the war.



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However, as previously mentioned, the average cost per kwh is decreasing, not increasing, if we select the ten years 1953 to 1962 inclusive. Thus, the trend in Ontario Hydro costs closely parallels that in the U.S.A. as shown in the following tabulation:

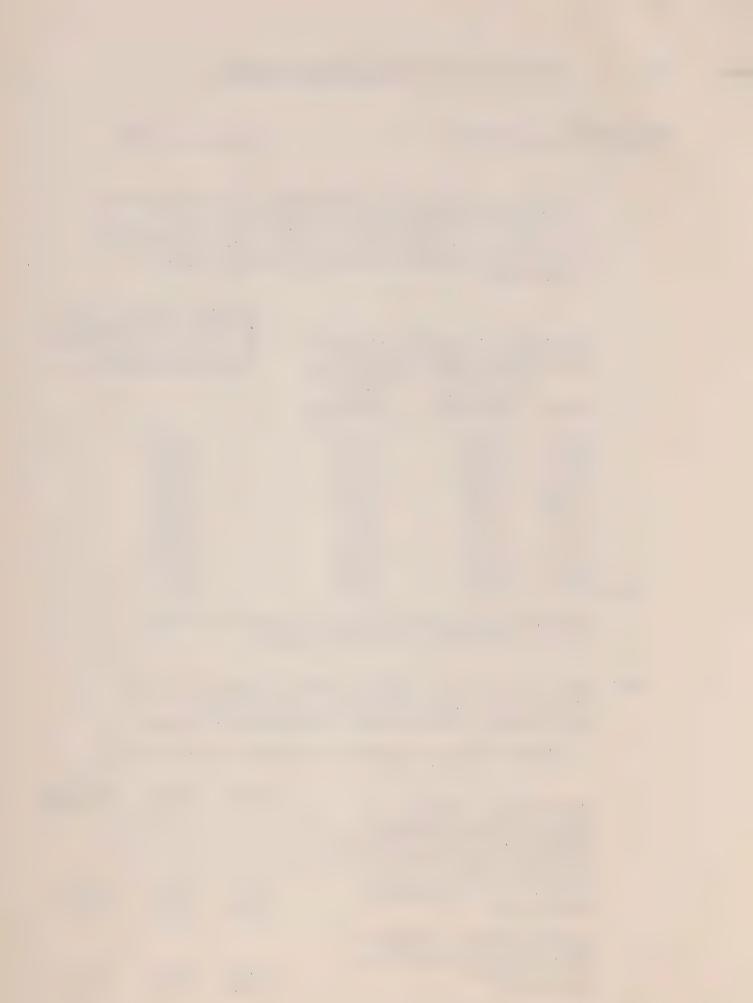
		l Customers	wh to Resi- in Ontario Served by	Residential Customers in U.S.A. (Per Edison Electric Institute)
		Municipal		
	Year	Utilities	System	
	1953	1.20¢	2.27¢	2.74¢
	1954	1.20	2.25	2.70
	1955	1.18	2.20	2.65
	1956	1.18	2.12	2.61
	1957	1.18	2.07	2.56
	1958	1.16	1.96	2.54
	1959	1.13	1.91	2.51
	1960	1.13	1.88	2.47
	1961	1.13	1.87	2.45
lst.		1.13	1.86	N/A

We have no similar figures to enable us to make such a comparison with Shawinigan.

(b) That in the period 1942 - 1961 the trend in cost to the residential customer in Ontario was unfavourable compared with Shawinigan's rates.

The following figures are quoted to prove this:

Residential (based on 500 kwh of use per Mo.) Average bill in 21 Ontario Municipalities selected by Barron's from the 355	<u>1942</u>	<u>1961</u>	% Increase
served by the Commission	5.12	6.07	+18.5
Shawinigan	6.96	6.85	- 1.6
General Service (based on 300 kwh of use per Mo.) Ontario Hydro Shawinigan	3.09 6.60	3.78 4.90	+22.3 -25.8



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It is not known to what "General Service" refers. Therefore, no comment can be made.

No mention is made in this statement of why the 21 Ontario municipalities were selected for the comparison, and this selection is of course the key point.

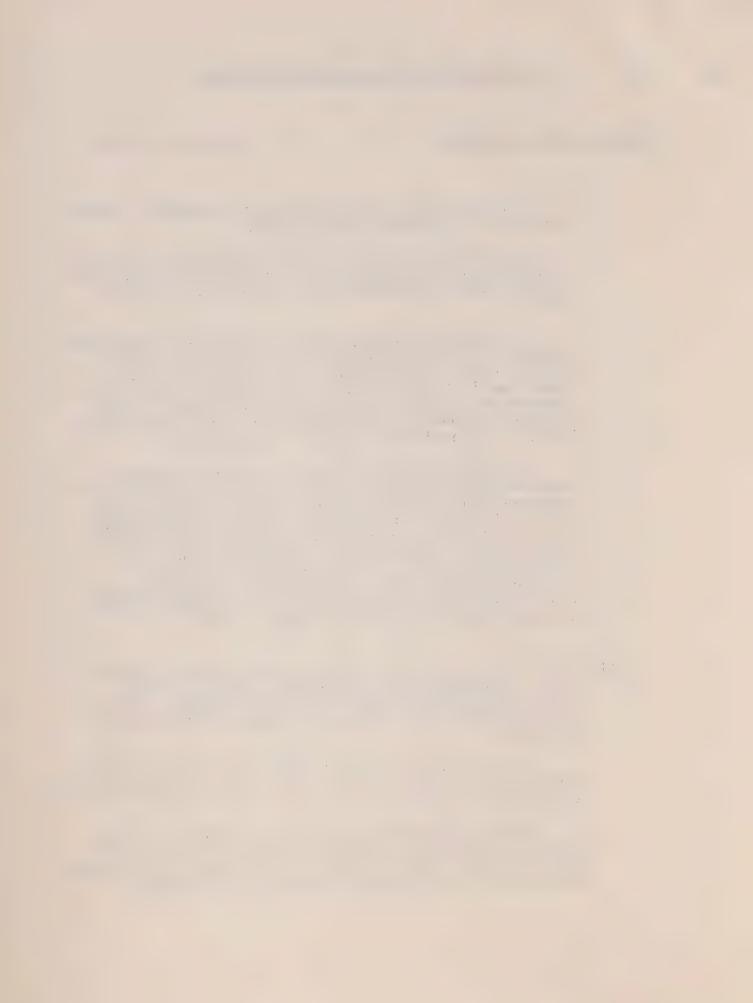
In 1942 the average use by residential municipal customers in Ontario Hydro was 178 kwh per month. Since the kwh use by Shawinigan customers is now less than in Ontario Hydro, we seriously doubt that Shawinigan in 1942 had sufficient customers using 500 kwh per month to warrant the use of this size of block as an equitable basis of comparison.

We have insufficient data on which to base an adequate comparison with Shawinigan. As for Ontario Hydro we can definitely state that our average cost per kwh in 1942 was 1.26 cents based on an average use of 178 kwh per month, while in 1961 the average cost was 1.13 cents based on an average use of 472 kwh per month — a reduction of 10.3% in average cost per kwh. The author's figures suggest that Shawinigan's cost per kwh for 500 kwh in 1961 was approximately equal to that in 1942.

(c) Rural Rates - In the section of the article dealing with residential rate trends the author suddenly makes the statement that "For rural service, Ontario received \$9.22 for 500 kwh; in Quebec, the charge was \$8.15".

The figure for Ontario Hydro is right for Rural hamlet residential, but we have no way of checking the Quebec figure.

If the author was striving to compare average costs for residential users in Ontario and Quebec, it would have been fairer if he had gone to published statistics of the Dominion Bureau of Statistics.



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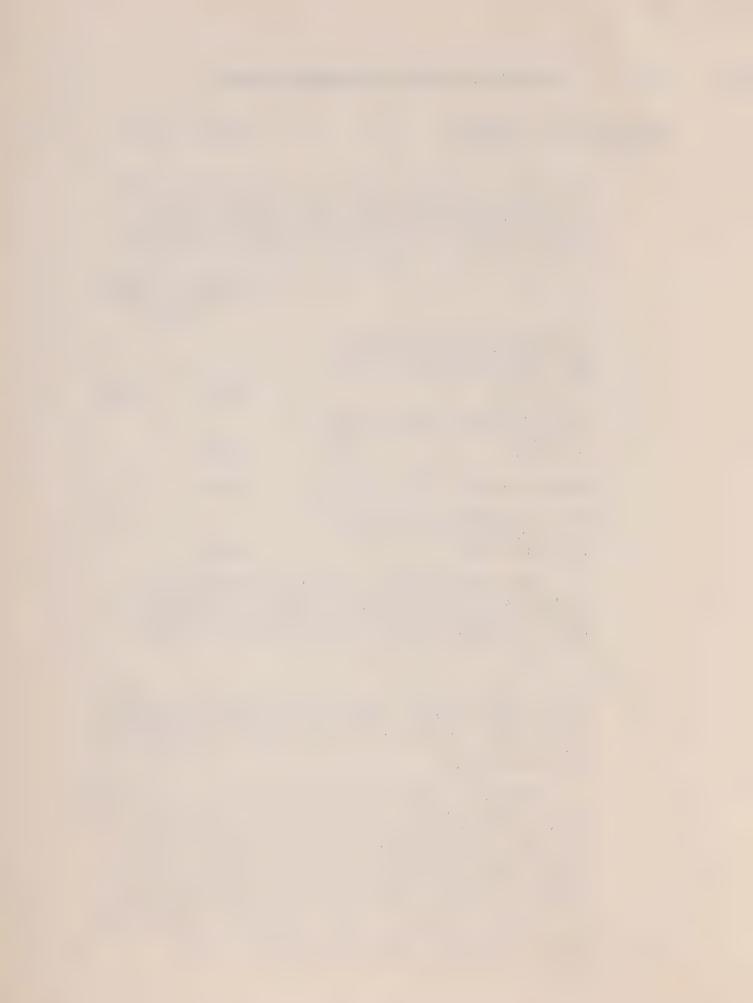
This data for 1960 is set out below together with a breakdown of the Ontario Hydro component of the Ontario figure. This breakdown can be seen on Pages 170 and 176 of the 1961 Annual Report where the cost trend is shown for a period of 10 years.

	Ontario per	Quebec kwh
Average cost to Domestic and Farm service customers per Dominion Bureau of Statistics	1•34¢	1.45¢
Ontario Hydro - residential customers in the Rural Power District	1.88¢	
Ontario Hydro - Farm Service	1.96¢	
Ontario Hydro - residential type customers supplied by municipalities	1.13¢	

The lower average for all residential type customers in Ontario is, no doubt, the result of higher average annual consumption per customer, which in Ontario was 5,308 kwh in 1960 compared to Quebec at 4,079 kwh.

(d) "The Ontario Commission has been raising the rates on its lowest cost, biggest load buyers: toward the end of 1960, industrial power rates went up by \$3.50 per kw, the equivalent of about 8% to 10% depending upon locality."

This statement implies that all large industries served directly by Ontario Hydro were subject to rate increases of \$3.50 per kw in 1960. This is not correct. This general increase applied only to direct industrial customers in Northern Ontario, where a slowdown in the rate of industrial load growth, a drastic reduction in uranium production, coupled with higher interest and labour rates, made an increase necessary. This increase of \$3.50 per kw did not apply to the large bulk of direct industrial load in Southern Ontario.



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(e) "The paper industry in Ontario pays an average of 0.50 cent per kwh; in adjoining Quebec, it pays 0.27 cent."

The figure for Ontario is approximately correct and the Quebec figure can be derived from a publication of the Dominion Bureau of Statistics which quotes a cost of 0.30 cent. This Quebec figure probably comes about by the fact that large blocks of low priced secondary energy have been combined with primary power. The 1900 Hydro Quebec annual report shows the secondary energy charge to "industrial" customers as 0.24 cent per kwh and to "wholesale" customers as 0.14 cent per kwh.

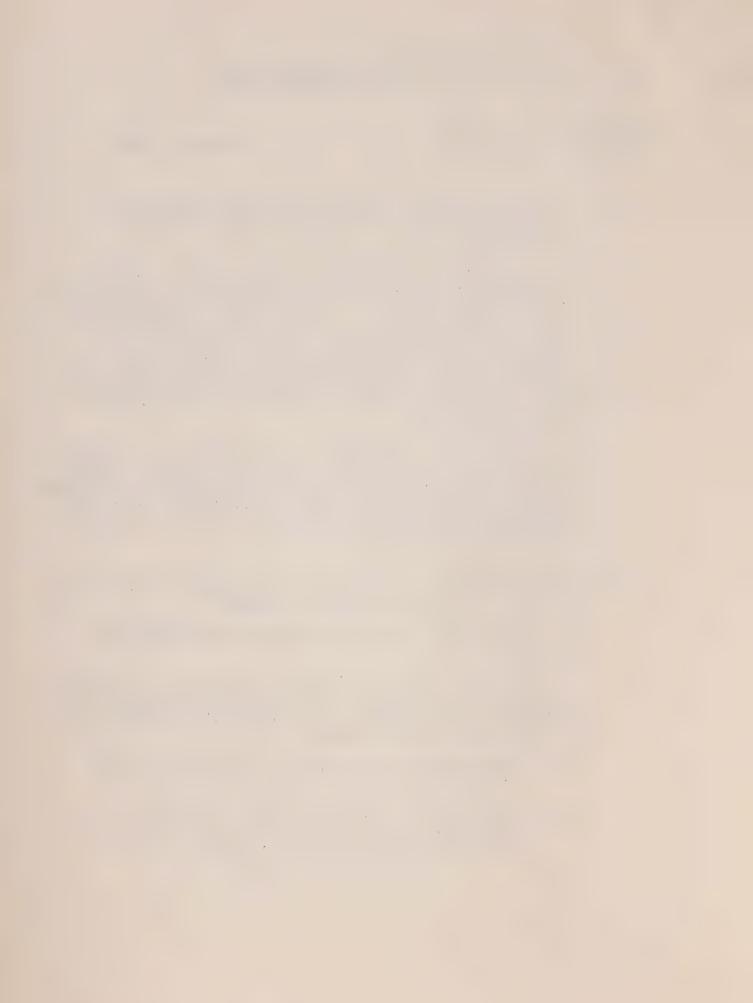
There is no doubt that in the Province of Quebec with 100% of its resources served by hydraulic plants substantial quantities of secondary energy are available at certain times of the year. In contrast, only minor quantities are available in Ontario which is mostly used to back off thermal plants.

(f) "All industries in Ontario pay an average of 0.08 cent or nearly twice as much as in Quebec."

The author evidently intended to say 0.80 cent per kwh.

We have no way of checking this rate of 0.80 cent per kwh, but can furnish the following information on industrial power rates. Our industrial customers fall into two large groups; namely -

- (i) Those supplied by municipal utilities which in 1961 consumed some 8 billion kwh and
- (ii) those served by Ontario Hydro as direct industrial customers which in the same year consumed 8.2 billion primary kwh.



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As far as the first group is concerned, the tabulation on Page 176 of the 1961 Annual Report, under Industrial Power, shows that the average charge in 1952 was 0.87 cent, and while it fluctuated during the 10-year period, the rate in 1961 was still 0.87 cent per kwh. The vast majority of these customers are engaged in secondary manufacturing, and use relatively small amounts of power at low load factor and at low voltage. Extensive distribution facilities are required to serve them, adding to the cost of energy.

The second class of Ontario customer, namely Direct Industrials, chiefly consist of basic industries such as mines, paper mills, chemical, electrochemical and electrometallurgical plants. These customers, buy power in large blocks, and at high voltages, and usually operate at high load factors and in 1961 paid on the average, 0.57 cent per kwh for primary power.

Presumably in the quotation given above the author is saying that the rate to Quebec industry on the average is 0.40 cent per kwh. We have no way of checking the basis of this claim because the rates charged to industrial customers are normally treated as strictly confidential. Such information as is available to us indicates that Shawinigan charges for firm power are of the order of 0.43 cent per kwh. In fact, we understand that new industry in Quebec today must pay four to five mills for high load factor power delivered at high voltage.

A more definitive approach would be to refer to the Dominion Bureau of Statistics for 1960 which shows a rate for all of Quebec of 0.49 cent per kwh rather than the 0.40 cent per kwh stated by the author.

The following observations are made on some of the factors affecting this Quebec rate of 0.49 cent per kwh:-

In Quebec there is a concentration of high load factor industry such as aluminum smelting and pulp and paper. The effect of this concentration shows



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up in annual system load factors which in 1961 were about 65% for Ontario compared to 71% for Quebec which under normal rate schedules will give a lower cost per kwh in Quebec. Moreover, in Quebec, many industries are located on tidewater close to power sites and timber limits.

In Quebec we believe there are a greater number of power companies which are "captive" to say a pulp and paper mill which is the sole owner of the power company. In such cases the transfer price of power involves no transmission and, in fact, the price may be dictated by considerations independent of the cost of power production.

All of Ontario's large low cost sources of hydraulic energy have now been developed, and Ontario is turning to marginal hydraulic developments and thermal generation.

These factors, together with the large quantity of surplus energy in Quebec, referred to above, all combine to create a situation in which one would expect average power costs in Ontario to be higher than in Quebec. However, it is possible that the gap between the two rates will be narrowed as Quebec carries through its major and more costly hydraulic development program in the period of higher interest rates and costs now prevailing.

IV. That Shawinigan has shown a greater penetration of the market for electricity or, in other words, "the Shawinigan system achieved much greater headway in spreading the use of electricity".

This rather garbled section of the article gives certain comparisons about distribution of load which may be



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summarized as follows:	<u> 1951</u>	1961	
Ontario Hydro (Evidently taken from a chart in the Short Annual Report dealing with disposal of units of energy - primary and secondary)			
Large Customers	44.3%	36.1%	
Rural	6.6	8.4	
Municipalities (actually refers to the power sold to municipalities for retailing to residential, commercial and industrial power			
customers)	49.1	55.5	
	100.0	100.0	
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Shawinigan (Evidently taken from Annual Reports dealing with distribution of the revenue dollar derived from primary electric sales only)			
Large Industrial	57.0%	42.0%	
Rural	9.0	11.0	

The main claim seems to relate to the wider distribution of power - presumably to the rural and residential user. This cannot be deduced from the table since no figures are shown for Shawinigan residential and in the Ontario Hydro percentages the figures are buried in the transfer to municipalities.

No figures stated

Commercial and Residential



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In actual fact the table proves nothing because presumably if all power demands are satisfied, it is immaterial insofar as market penetration is concerned whether the ratios taken by various classes of customer change or not.

On the matter of penetration the Dominion Bureau of Statistics produced figures three years ago to show that 99% of householders in Ontario had electricity. Furthermore, the Commission's own studies indicate that electricity is available to 95% of Ontario farms. Also, it should be again noted that residential customers in Ontario exceed in their use of energy similar customers in Quebec, including Shawinigan.

Rather than dealing with market penetration this section seems to be designed to lead up to a criticism of the assistance given to the rural community by the Government which stood at \$115,917,808 at December 31, 1961 per the audited Balance Sheets. The Province ceased giving this assistance to the rural community in Southern Ontario in 1958. The continuing contribution in Northern Ontario has averaged about \$960,000 per annum in the last four years.

This entire benefit has gone to the credit of the Rural operation and is, of course, a "hidden cost" of providing power to the rural community as claimed. However, the claim that "Hydro is using the Rural subsidized load to disguise the need for industrial rate increases" is completely incorrect and unsubstantiated. Rural figures could not be certified by our auditors if the benefit were otherwise treated. The involved juggling of numbers in this paragraph of the article cannot be followed.

V. That Ontario Hydro's rates would be still higher if it paid taxes like private industry.

Ontario Hydro pays the same kind of taxes to Canada, the Province and Municipalities as would be encountered by Shawinigan, with the exception of Income Tax, from which Ontario Hydro is exempt.



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In 1961 these were:

Municipal, Provincial and Federal Government Taxes paid by Ontario Hydro

\$4,580,277

Similar Taxes paid by Municipal Electric Utilities based on a 1960 survey which has not been up-dated

1,509,347

Water Rentals

6,774,314

Total

\$12,863,938

These payments represent 4.1% of revenue and not 1.8% claimed in the article.

The annual Report of the Shawinigan system shows income taxes as a separate item of expense which when related to total power revenues indicates a ratio of 13.8%. Thus, it presumably could be stated that the payment of income taxes by Shawinigan adds 13.8% to their rate structure.

If the rates in Ontario Hydro produced the same percentage of taxable income as in the Shawinigan system (which, of course, they do not because the Commission is selling power at cost), this would presumably mean that its income tax bill would be 13.8% of the gross revenues of the combined Ontario Hydro and Municipal systems. In 1961 this revenue amounted to \$312 million and its income taxes on this basis would have amounted to \$43 million, not \$53.9 million as mentioned in the article.

VI. Certain other derogatory comments, such as:

(a) Purchased Power - There is an involved presentation of numbers in respect of purchased power and the use of water at Niagara, the purpose of which discussion is completely obscure. However, the reference seems to be made in order to provide a stepping stone for some nasty comment about the repudiation of the Quebec Power Contracts in the mid 1930s.



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- (b) Thermal Generation It claims that in building such plants Ontario Hydro is "straying from its original purpose". This is hardly worthy of comment. Would the author suggest that Ontario Hydro cease to supply load growth beyond its hydraulic capacity and thus force a duplication of the power system by private companies who would have to employ the higher production cost thermal plants? If so, which customers would be allocated the advantage of the low cost hydraulic power?
- (c) Return on Investment Figures are quoted to compare a return of 5.1% in Shawinigan against 3.88% in Ontario Hydro assuming Income Taxes were paid. The latter figure is then qualified with the words "on such a low profit, it simply could not stay in business".

Power is sold at cost. Therefore, the conventional return on investment is nil. The Commission has remained in business for over fifty years on this basis. We cannot determine how the author calculated his figure of 3.88%.

(d) Extra High Voltage - The article states -"Development of high voltage transmission has been largely neglected." Since its inception Ontario Hydro has been one of the major pioneers throughout the world in the development of high voltage transmission. For example, the Commission was one of the first to utilize 115 kv transmission (in 1910) and 230 kv (in 1928). Furthermore, Hydro today as part of an \$182 million Northern Development Program is building an Extra High Voltage line to bring power 450 miles from the James Bay watershed to Southern markets. To our knowledge this will be the first major line constructed in North America for operation at a voltage as high as 500,000.

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January 7, 1963

(e) A claim that Ontario Hydro's costing methods penalize users at the end of a long line and indicating that Shawinigan charges relatively uniform rates by comparison.

It is true that in the matter of costing power to municipalities we recognize distance from source as far as low voltage lines are concerned. However, these costs are mitigated by a co-operative arrangement between the municipalities whereby all share in these costs in such a way that no municipality pays more than approximately \$5.50 per kw for low voltage lines, irrespective of how far it may be from the high voltage grid.

It should also be mentioned the Commission instituted many years ago a uniform rate structure for all farm, residential and commercial customers in the rural community and maintains a uniform rate for mining power throughout the Province.

Conclusion

In dealing with criticisms of this kind our normal approach is to prepare a logical and definitive analysis. Unfortunately, the nature of this article has made it impossible to maintain complete clarity or find a firm basis for the comparisons referred to. The result is less than satisfactory in spite of the number of hours expended on the project by several members of senior Management.

Yours very truly,

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CHAIRMAN

January 7, 1963

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